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Attached is Exhibit A for US Application No. 09/992,597: English translation for foreign reference WO 92/19488 used as a prior art.

CHONG H. KIM
PRIMARY EXAMINER

PTO 07-442

International Publication No.
WO 92/19488

GEAR-CHANGING LEVER DEVICE FOR BICYCLES

Yoshihisa Iwata

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. NOVEMBER 2006
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GEAR-CHANGING LEVER DEVICE FOR BICYCLES

[Jitenshayo hensoku sosa lever sochi]

Inventor:	Yoshihisa Iwata
Applicant:	Maeda Industries Ltd.

Kokai document attached: International Search Report

[There are no amendments to this patent.]

Industrial application field /1*

The present invention concerns a gear-changing lever device for bicycles. In more detail, it concerns a gear-changing lever device for bicycles that allows for an easy mounting of the operating cable.

Prior art

A bicycle gear change device is equipped with the main part of a gear change device that is provided near wheels and a gear-changing lever device that is attached in a proper location of the frame or the handlebar, and the aforementioned main part of the gear change device and the gear-changing lever device are connected to each other by an operating cable in their rough construction. The aforementioned operating cable is pulled by rotating the operating lever of the gear-changing lever device, and this will actuate the aforementioned main part of the gear change device.

A gear-changing lever device generally has a structure in which a lever shaft is provided to a bracket that is attached to the frame and the handlebar, and an operating lever that has an operating arm that projects outward in the direction of the radius from the cylindrical part and the outer circumference of the aforementioned cylindrical part is supported in a rotatable manner to this lever shaft by fitting the aforementioned cylindrical part to the aforementioned lever shaft. One end of the aforementioned operating cable is attached to the outer circumference of the aforementioned cylindrical part, and a cable take-up groove for taking up this operating cable is also formed, and the aforementioned operating cable is taken up into the aforementioned cable take-up groove and pulled by operating the operating lever to rotate in one direction. The aforementioned operating cable will be delivered out of the aforementioned take-up groove while being pulled by the force of a return spring that is integrated into the main part of the gear change device by rotating the aforementioned operating lever in a reverse direction. The motion of the operating cable in the direction of the shaft during this will be transmitted to the main part of the gear change device and will actuate it.

A prescribed rotational resistance by a frictional force, for example, is provided to the aforementioned operating lever, and the operating lever will be held in the intended rotational position by this rotational resistance against the strength of the aforementioned return spring. Accordingly, a rotational operating strength that exceeds the force that has the aforementioned

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* [Numbers in the right margin indicate pagination of the original text.]

frictional force added to the strength of the aforementioned return spring will be necessary for pulling the aforementioned operating cable. Accordingly, there is a risk that the rotational operating strength changes by the rotational position of the aforementioned operating lever, and the gear change operability may deteriorate. /2

For solving the aforementioned problem, a spring providing a resiliency that opposes the return spring of the aforementioned main part of the gear change device is inserted into the aforementioned gear-changing lever device in some cases for creating a structure for the attainment of a smooth rotational operation of the operating lever.

For installing the aforementioned operating wire in the aforementioned gear-changing lever device, the mounting activity of the aforementioned operating wire must be attained in the rotational position of the operating arm for when the maximum amount of the aforementioned operating wire is delivered out for adjusting the corresponding relationship between the rotational position of the aforementioned operating lever and the gear change position of the aforementioned gear change device.

However, when the aforementioned spring is inserted into the gear-changing lever device, the operating wire cannot be mounted unless the aforementioned gear-changing lever is held in the aforementioned rotating position against the force of the aforementioned spring. Accordingly, the need occurs to hold the operating lever by the operator's hand or to provide a rotational resistance to the operating lever that exceeds the necessary amount.

As a result, a risk occurs that the mounting activity of the operating wire decreases and the performance of the gear-changing lever device may suffer when the force of the aforementioned spring changes.

The installation of a so-called clicking mechanism, for example, can also be considered for holding the aforementioned gear-changing lever in a prescribed position against the force of the aforementioned spring; however, an issue of a soaring manufacturing cost occurs.

Disclosure of the invention

Accordingly, the objective of the present invention is to offer a gear-changing lever device for bicycles in which the aforementioned operating lever can be held in a prescribed position against the force of the aforementioned spring for improving the mounting activity of the operating cable.

Another objective of the present invention is to offer the aforementioned gear-changing lever device in which the frictional resistance that is provided to the aforementioned operating lever is lowered for improving the gear-changing performance.

Furthermore, another objective of the present invention is to offer a gear-changing device that can hold the aforementioned operating lever in a prescribed rotational position without using

a structure that requires a locking mechanism with a high manufacturing cost such as a clicking mechanism, for example, but in a very simple structure at a low cost.

The present invention is a gear-changing lever device for bicycles that has a lever shaft provided to a bracket that is attached to the frame, and an operating lever that has an operating arm that projects outward in the direction of the radius from the cylindrical part and the outer circumference of the aforementioned cylindrical part is supported in a rotatable manner on this lever shaft by fitting the aforementioned cylindrical part to the aforementioned lever shaft, and it has the following characteristic. /3

More precisely, it has a structure in which a locking pin which projects out towards the other side is provided at either side of the aforementioned bracket and the cylindrical part, a guide groove that extends in an arc-like shape for permitting the aforementioned operating lever to rotate within a prescribed range while storing the aforementioned locking pin is provided to the other side of the aforementioned bracket and the cylindrical part, and a locking structure that can elastically lock the aforementioned locking pin is provided in the end area of the aforementioned guide groove.

Other objectives, characteristics, and advantages of the present invention will be clarified in the explanation of the desirable application examples that will be explained below while referring to the figures attached.

Brief description of the figures

Figures 1 through 5 are diagrams that indicate the first application example of the present invention.

Figure 1 is a top view diagram of a gear-changing lever device in the present invention.

Figure 2 is a side view diagram of the gear-changing lever device in Figure 1 in the direction of arrow P.

Figure 3 is a cross-sectional diagram of Figure 2 along line III-III.

Figure 4 is a cross-sectional diagram of Figure 3 along line IV-IV.

Figure 5 is an enlarged diagram of a major part in Figure 4.

Figure 6 is an enlarged diagram of a major part that indicates another application example, which is a diagram equivalent to Figure 5.

Preferred embodiments of the invention

Preferred embodiments of the present invention will be explained concretely based in Figures 1 through 6.

Figures 1 through 5 indicate the first embodiment of the invention.

Figure 1 is a top view diagram where the gear-changing lever device in the present invention is installed on a so-called flat handle. Figure 2 also is a side view diagram when the aforementioned gear-changing lever device in Figure 1 is viewed from the rear of a bicycle (direction of arrow P).

A grip part (2) that is covered with a soft resin, for example, is formed at both ends of a handlebar (1), and a brake bracket (3) is also provided inside this grip part (2) in such a manner that it projects frontward. The base end part of the brake lever (4) that extends in front of the aforementioned grip part (2) is axially attached to the aforementioned brake bracket (3).

The gear-changing lever device (5) in this application example is arranged inside the aforementioned brake bracket (3) at the lower side of the handlebar (1), as shown in Figures 1 and 2, and it has a rough structure that is equipped with a bracket (6) that fits and attaches to the aforementioned handlebar (1) and an operating lever (8) that is supported in a rotating manner on this bracket (6). /4

The aforementioned bracket (6) is equipped with a mounting band part (6a) that fits into the aforementioned handlebar (1) and a lever mounting base (6b) that is displaced to the front part of the handlebar (1) by this mounting band part (6a), and the lever shaft (7) is formed at the aforementioned lever mounting base (6b) in such a manner that it extends out below.

The aforementioned operating lever (8) is equipped with a cylindrical part (9) and an operating arm (10) that extends outward from this cylindrical part (9) in the direction of the radius, and the aforementioned cylindrical part (9) fits into the aforementioned lever shaft (7), supported in a rotating manner by the aforementioned bracket (6).

The end part of the outer wire w1 of the gear change gear W, which has been guided from the main part of the gear change device, which is not shown in the illustration, is attached to an outer receiver (11), which is integrally formed at the lever mounting base (6b) of the aforementioned bracket (6). The inner wire w2 that extends out from the aforementioned outer receiver (11) is also coiled in a wire groove (12) that is formed at the outer circumference of the aforementioned cylindrical part (9), and a nipple (13) at its end part is locked in an appropriate part at the outer circumference of the aforementioned cylindrical part (9).

As the aforementioned operating arm (10) is rotated, the nipple (13) at the front end of the inner wire w2 also rotates together with the aforementioned cylindrical part (9). Through this, the inner wire w2 will be pulled out or delivered in, to and from the outer wire w1, which is attached to the aforementioned outer receiver (11), a relative motion in the direction of the shaft is provided between the inner wire w2 and the outer wire w1, and the main part of the gear change device, not shown in the illustration, will be actuated by the relative motion of these two wires.

The front end part of the aforementioned operating arm (10) in this application example has a shape that is branched nearly in a Y shape, as shown in Figure 1. Accordingly, both outer and inner side faces of a pair of branched arms (10a) and (10b) can be pressed according to the rotational position of the aforementioned operating arm (10). It is also structured so that the /5
aforementioned operating arm (10) can be operated to rotate in both directions by just one finger, either the thumb or the index finger, by placing the finger on the fork part (10c) of the aforementioned branched operating arms (10a) and (10b) and rotating the operational arm (10).

In the gear-changing lever device in this application example, as shown in Figure 3, a friction mechanism (14) that provides a prescribed frictional force to the aforementioned operating lever (8) is provided at the opposite side of the aforementioned lever mounting base (6b) of the aforementioned cylindrical part (9), and a coil spring (16) that elastically presses the aforementioned operating lever (8) is inserted in a ring-shaped space (15) that is formed inside the aforementioned cylindrical part (9).

The aforementioned friction mechanism (14) has a structure that is equipped with an adjusting screw (18) that is screwed into a screw hole (17), which is formed at the aforementioned lever shaft (7), a pressure cover (19), which is arranged inside the aforementioned adjusting screw (18) and receives and supports the head part (18a) of the aforementioned adjusting screw (18), and a spring washer (20) in a circular plate shape that has its central hole (20a) fit into the end area of the aforementioned lever shaft (7) in such a manner that it can slide in the direction of the shaft and it also cannot rotate and has the outer circumferential part (20b) come into contact with the side face of the aforementioned cylindrical part (9). The inner circumferential part of the aforementioned spring washer (20) is constructed in such a manner that it can be pressed in the direction of the shaft by the aforementioned adjusting spring (18) through the aforementioned pressure cover (19). Both side faces of the aforementioned cylindrical part (9) is pressed between the aforementioned spring washer (20) and the lever mounting base (6b), and a prescribed frictional force can be generated by adjusting the aforementioned adjusting screw (18).

The aforementioned coil spring (16) has one end (16a) inserted into a locking hole (21a) of the aforementioned cylindrical part (9) and locked, and has the other end (16b) inserted into a locking hole (21b) of the spring washer (20) that is fit into the aforementioned lever shaft (7) in such a manner that it cannot rotate and is locked for elastically pressing the aforementioned operating lever (8) in a direction against the force of the return spring of the main part of the gear change device, which is in the direction of rotating the aforementioned operating lever (8) in the direction to pull the wire.

Furthermore, in this application example, a locking pin (22) that projects out towards the cylindrical part (9) of the aforementioned operating lever (8) is provided at the lever mounting

base (6b) of the aforementioned bracket (6), and a guide groove (23) that can store the aforementioned locking pin (22) is also provided at the aforementioned cylindrical part (9).

The aforementioned locking pin (22) in this application example is integrally formed at the washer (24) that fits into the aforementioned lever mounting base (6b) by pressing, and it projects outs nearly parallel to the aforementioned lever shaft (7).

The aforementioned guide groove (23) is formed in an arc-like shape centering around /6
the shaft center of the aforementioned lever shaft (7), as shown in Figure 4, and it is formed in such a manner that it allows the aforementioned operating lever (8) to rotate in a prescribed range while storing the aforementioned locking pin (22).

A locking structure (25) that can elastically lock the aforementioned locking pin (22) is formed in the end area of the aforementioned guide groove (23), as shown in Figures 4 and 5.

In the aforementioned locking structure (25) in this application example, a locking hole (27) that has a diameter that can store the aforementioned locking pin (22) is formed in one end area of the aforementioned guide groove (23) in continuation to the guide groove (23) through a neck part (26) that has a gap smaller than the diameter of the locking pin (22), and a pair of round holes (28) is formed at both sides of the aforementioned neck part (26).

The aforementioned cylindrical part (9) in this application example is formed of a resin, and the gap in the aforementioned neck part (26) is formed smaller than the diameter of the aforementioned locking pin (22). Therefore, the locking pin (22) can be elastically locked into the aforementioned locking hole (27). Moreover, the neck part (26) can easily change its form elastically by applying a rotational force that exceeds a prescribed amount to the operating lever (8) because of the round holes (28) that are formed at both sides of the neck part (26), and the locking pin (22) can pass through the neck part (26).

The installation of the aforementioned locking structure (25) allows locking of the aforementioned locking pin (22) in the aforementioned end area in the guide groove against the force of the aforementioned coil spring (16) that is provided inside the gear-changing lever device, and this will allow holding the operating lever (8) in the rotational end position where the locking pin (22) comes into contact with the end area in the guide groove.

As a result, it will be unnecessary for the operator's fingers to hold the aforementioned operating lever (8) in the rotational end position against the force of the aforementioned coil spring (16) when mounting the operating wire W, and it will dramatically improve the mounting activity of the operating wire.

It is also not necessary to unnecessarily increase the frictional resistance that is provided to the aforementioned operating lever (8) for holding the operating lever (8) in the rotational end position, and that makes it possible to improve the operability of the gear-changing lever device.

Furthermore, the locking structure (25) in the present invention is a structure that has only the aforementioned locking pin (22) and the aforementioned guide groove (23) provided, which does not generate an issue of a soaring manufacturing cost such as with the clicking mechanism, for example.

Figure 6 indicates the second application example of the present invention. /7

The locking structure (25a) in this application example has a structure in which a locking spring (30) that can elastically lock the aforementioned locking pin (22) is attached in the end area of the guide groove (29).

The aforementioned locking spring (30) is equipped with a ring-shaped base part (32), which is attached to an attachment hole (31) that is connected to the end area of the aforementioned guide groove (29), and a pair of free end parts (34) that extend out in a near letter □ shape towards the aforementioned guide groove (29) with the inclusion of an open neck part (33) that has a gap h smaller than the diameter of the diameter d of the aforementioned locking pin (22). The inner diameter d of the aforementioned ring-shaped base part (32) is established to correspond to the diameter d of the aforementioned locking pin (22) for allowing elastically locking the aforementioned locking pin (22) inside the aforementioned ring-shaped base part (32).

The gap H in the neck part (35) of the aforementioned attachment hole (31) that is connected to the aforementioned guide groove (29) is established smaller than the outer diameter D of the aforementioned locking spring (30), and the open neck part (33) of the aforementioned locking spring (30) is established to open larger than the diameter d of the aforementioned locking pin (22). Accordingly, when a rotational operating force that exceeds the prescribed amount is applied to the operating lever (8), the aforementioned locking pin (22) will have the aforementioned open neck part (33) elastically enlarged and can pass through this part.

The aforementioned structure will allow holding of the operating lever (8) in the rotational end position where the aforementioned locking pin (22) comes into contact with the aforementioned end area of the guide groove, and the same effect as in the aforementioned first application example can be displayed.

Furthermore, the gap H in the neck part (35) of the aforementioned attachment hole (31) in this application example is formed larger than the diameter of the aforementioned locking pin (22), and the aforementioned locking structure (25a) can be removed by removing the aforementioned locking spring (30). Accordingly, it can be applied to a gear-changing lever device that does not have a coil spring (15) inserted in it.

The scope of the present invention is not limited to only the application examples described above.

In the application examples, the locking pin (22) is provided to the bracket (6), and the guide grooves (16) and (29) are also provided to the cylindrical part (9) of the aforementioned operating lever. However, the guide grooves may be provided to the aforementioned bracket (6), and the locking pin may be provided to the aforementioned cylindrical part (9).

In the application examples, the aforementioned locking pin (22) is also formed in such a /8
manner that it projects towards the side face of the aforementioned cylindrical part (9); however, it may be formed in such a manner that it projects out to the outer circumference of the aforementioned cylindrical part (9).

Furthermore, in the application examples, the locking structure that utilizes the resiliency of the cylindrical part (9) itself and the locking structures (25) and (25a) that utilize the locking spring (30) are used, but other locking structures can also be used.

Furthermore, the aforementioned locking structure is also provided at one end of the guide groove; however, it may be provided at both ends of the guide groove.

Claims /9

1. A gear-changing lever device for bicycles, in which a lever shaft is provided to a bracket that is attached to a bicycle frame, and an operating lever that has an operating arm that projects outward in the direction of the radius from the cylindrical part and the outer circumference of the aforementioned cylindrical part is supported in a rotatable manner on this lever shaft by fitting the aforementioned cylindrical part to the aforementioned lever shaft,

a locking pin which projects out towards the other side is provided at one side of either the aforementioned bracket or cylindrical part,

a guide groove that extends in an arc-like shape that permits the aforementioned operating lever to rotate within a prescribed range while storing the aforementioned locking pin is provided,

and a locking structure that can elastically lock the aforementioned locking pin is provided in the end area of the aforementioned guide groove.

2. The gear-changing lever device for bicycles described in Claim 1 in which the aforementioned locking structure is structured by forming a locking hole that has a diameter that can store the aforementioned locking pin continuously in the aforementioned end area of the guide groove through a neck part that has a gap smaller than the diameter of the aforementioned locking pin.

3. The gear-changing lever device for bicycles described in Claim 2 in which a pair of round holes is formed at both sides of the aforementioned neck part.

4. The gear-changing lever device for bicycles described in Claim 1 in which the aforementioned locking pin is integrally formed at a washer that is fit and fixed to the aforementioned bracket or the aforementioned operating lever.

5. The gear-changing lever device for bicycles described in Claim 1 in which the aforementioned locking structure is structured by providing a locking spring that can lock the aforementioned locking pin in the end area of the aforementioned guide groove.

6. The gear-changing lever device for bicycles described in Claim 1 in which the aforementioned locking structure is provided at both end areas of the aforementioned guide groove.

7. The gear-changing lever device for bicycles described in Claim 1 in which the aforementioned locking structure is provided in one end area of the guide groove.

8. The gear-changing lever device for bicycles described in Claim 1 in which a guide groove is provided to the cylindrical part of the operating lever while a locking pin is provided to the aforementioned bracket.

9. The gear-changing lever device for bicycles described in Claim 8 in which the aforementioned cylindrical part is integrally formed by a resin.

Fig. 1

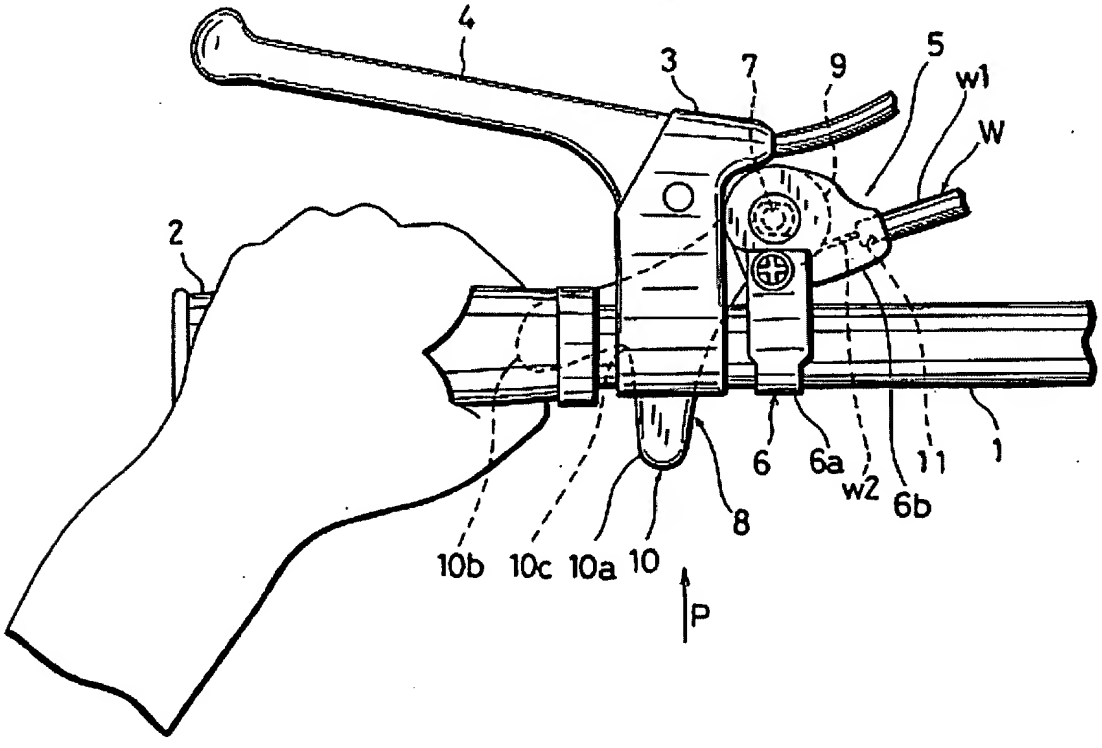


Fig. 2

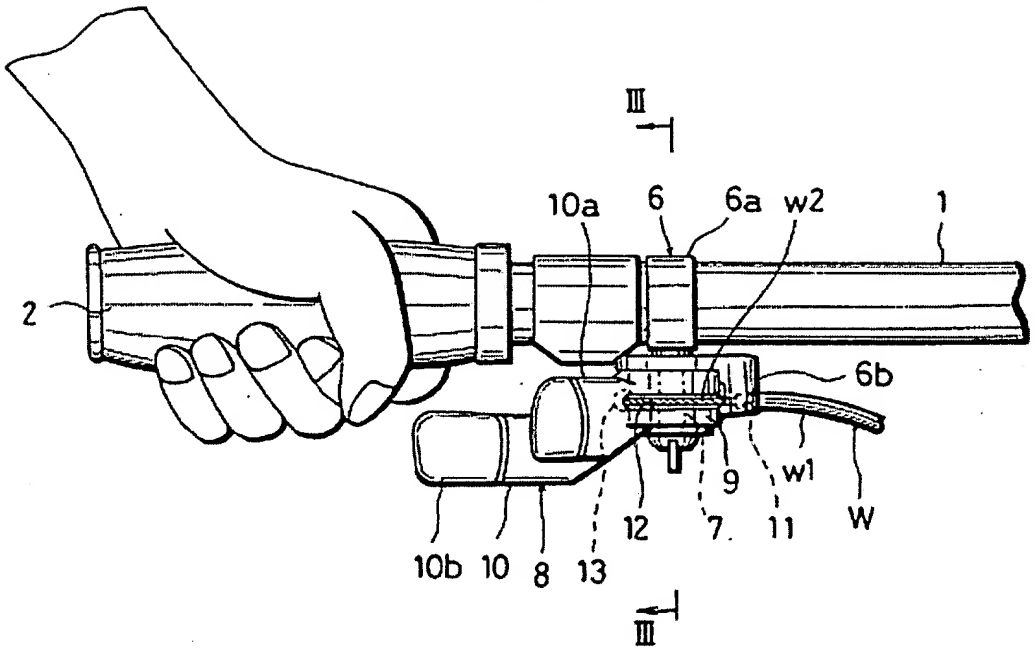

III
10a
6
6a
w2
1
2
6b
9
w1
12
7
11
W
10b
10
8
13
III

Fig. 3

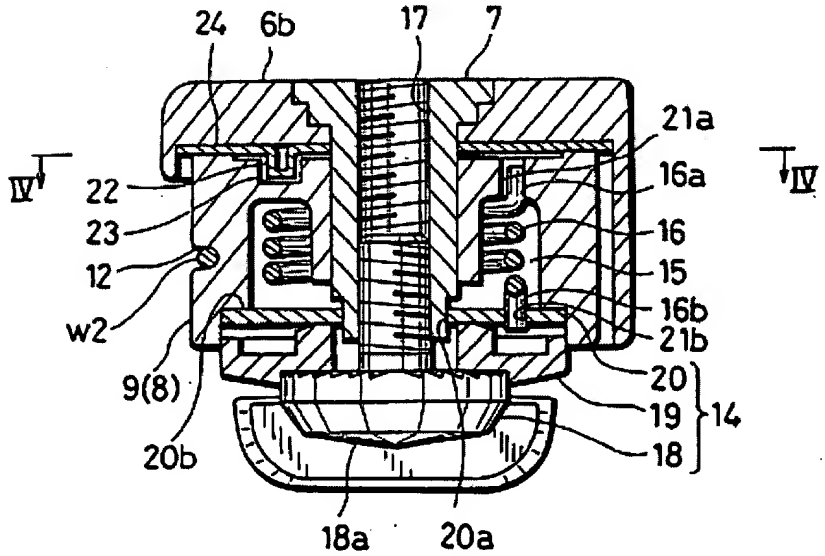

24
6b
17
7
21a
IV
IV
16a
22
23
16
12
15
w2
16b
21b
9(8)
20
19
14
20b
18
18a
20a

Fig. 4

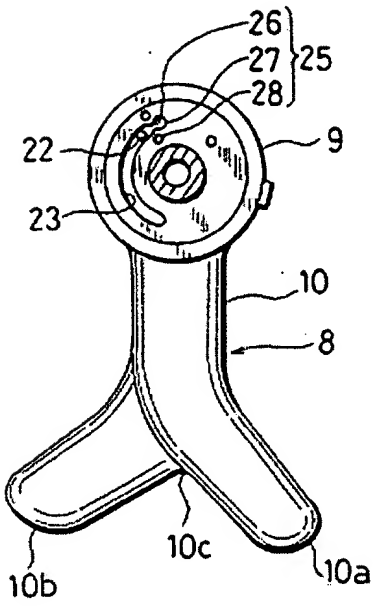


Fig. 5

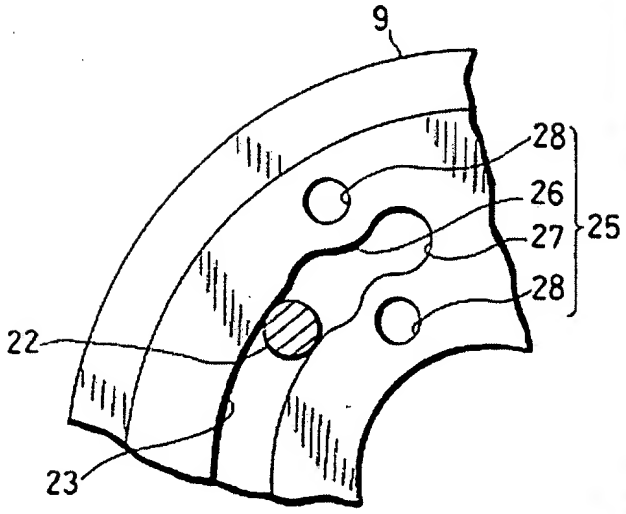
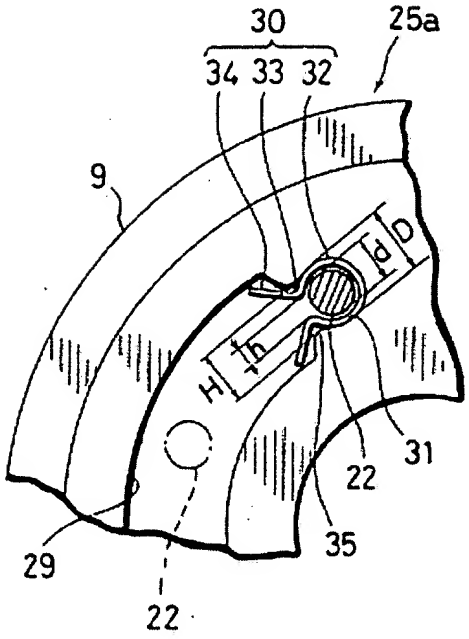


Fig. 6



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP92/00554

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[5] B62M25/04

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	B62M25/04, G05G5/03

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

Jitsuyo Shinan Koho 1925 - 1990
Kokai Jitsuyo Shinan Koho 1972 - 1990

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	US, A, 4,267,742 (Maximino R. Cabeza), May 19, 1981 (19. 05. 81), Fig. 1 (Family: none)	1, 9
A	US, A, 4,658,667 (Fichtel & Sachs AG), April 21, 1987 (21. 04. 87), Drawing Figure, & SE, A0, 8600234 & GB, A0, 8601154 & SE, A, 8600234 & GB, A1, 2169973 & DE, A1, 3501951 & NL, A, 8600125 & GB, B2, 2169973	1, 9
A	JP, Y2, 01-32105 (Suzuki Motor Co., Ltd.), October 2, 1989 (02. 10. 89), Fig. 5 (Family: none)	2-8
A	JP, U, 62-37324 (Mitsubishi Motors Corp.), March 5, 1987 (05. 03. 87), Figs. 1 to 2 (Family: none)	2-8
A	JP, Y2, 63-15117 (Maeda Kogyo K.K.), April 27, 1988 (27. 04. 88), Fig. 3 (Family: none)	1

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
July 20, 1992 (20. 07. 92)	August 18, 1992 (18. 08. 92)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	

Form PCT/ISA/210 (second sheet) (January 1985)

[International Search Report, continued

V. □ Opinion when international investigation is not conducted for a part of the claim range

This international investigation report will not be prepared for the following claim range in accordance with the stipulation in Law Article 8, Clause 3, regarding the international applications, etc., based on Patent Cooperation Treaty for the following reasons.

1. □ The claim range — has an item among the content items that does not require the international investigation.

2. □ The claim range — concerns the part of the international application that does not satisfy the specific requisite at the level that allows for an effective international investigation.

3. □ The claim range — is in the range of subordinate claims, and it has not been drafted in accordance with the stipulation in PCT regulations 6.4(a) sentence 2.

VI. □ Opinion when the requisite of singularity of the invention has not been satisfied

This international application contains 2 or more inventions as will be described next.

1. □ The required additional handling fee was paid during the appointed term, and this international investigation report was prepared for all the possible investigable claim ranges of the international application.

2. □ Only a part of the required additional handling fee was paid during the appointed term. Accordingly, this international investigation report was prepared for the following claim range for the invention for which the handling fee was paid.

The claim range —

3. □ The required additional handling fee was not paid within the appointed term. Accordingly, this international investigation report was prepared for the following claim range of the invention, which was initially described in the claim range.

The claim range —

4. □ The entire investigable claim range was investigated without requesting the required additional handling fee. Accordingly, the payment of the required additional handling fee was not ordered.

Caution with respect to the objection claim for the additional handling fee

□ The objection to the additional handling fee was claimed at the same time as the payment of the required additional handling fee.

□ The objection to the additional handling fee was not claimed at the same time as the payment of the required additional handling fee.

Form PCT/ISA/210 [Supplementary page (2)](January 1985)

Day : Friday
Date: 20-Oct-2006
Time: 09:13

SIRDEV MIS INTRANET

APPEAL CENTER RETURN

Application Number: 09992597 Date: 20-Oct-2006
Examiner: CHONG, KIM GAU: 3682

Appeal Document(s) that caused this Return -- *Please check at least one Document type:*

- ☑ Examiner's Answer
- ☑ Supplemental Examiner's Answer
- ☑ IDS
- ☑ Translation of foreign references needed
- ☑ Amendments not entered/considered
- ☑ Affidavits, Declarations, Evidence
- ☑ Artifacts
- ☑ Other

Reason for Return (from Appeal Specialist to Examiner) -- *Please check at least one Message box or enter text:*

- ☑ No Appeal Conference Held
- ☑ Conference initials needed (three)
- ☑ Headings
- ☑ New Ground of Rejection - TC Director signature needed

(256 characters max)

1.English translation needed for foreign reference WO 92/19488.

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